power-one®
Changing the Shape of Power

AURORA®

Photovoltaic Inverters

INSTALLATION AND OPERATOR'S MANUAL

Model number: PVI-2000-OUTD-UK *Rev. 1.0*

REVISION TABLE

Document Revision	Author	Date	Change Description
0	M. Trova	Dec. 17, 2006	First release of the document

SAVE THESE INSTRUCTIONS !

IMPORTANT SAFETY INSTRUCTIONS

POWER-ONE: Reproduction and disclosure, even partially, of the contents of this manual are strictly forbidden without prior authorization of Power-One.

IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety and operational instructions that must be accurately understood and followed during the installation and maintenance of the equipment.
To reduce the risk of electrical shock hazards, and to make sure the equipment is safely installed and commissioned, special safety symbols are used in this manual to highlight potential safety risks and important safety information. The symbols are:

WARNING: the paragraphs highlighted by this symbol contain processes and instructions that must be absolutely understood and followed to avoid potential danger to people.

NOTE: the paragraphs highlighted by this symbol contain processes and instructions that must be rigorously understood and followed to avoid potential damage to the equipment and negative results.

The equipment is provided with several labels, some of them with a yellow background, which are related to safety issues.
Make sure to read the labels and fully understand them before installing the equipment.
The labels utilize the following symbols:

	Equipment grounding conductor (Main grounding protective earth, PE)
	Alternate Current (Ac) value
	Direct Current (Dc) value
	Phase
	Grounding (Earth)

USEFUL INFORMATION AND SAFETY STANDARD

FOREWORD

- The installation of AURORA must be performed in full compliance with national and local standards and regulations
- AURORA has no internal user serviceable parts.
  For any maintenance or repair please contact the nearest authorized repair center. Please contact your reseller if you need to know the nearest authorized repair center.
- Read and understand all the instructions contained in this manual and become familiar with the safety symbols in the relevant paragraphs before you install and commission the equipment
- The connection to the distribution grid must be done only after receiving approval from the distribution utility as required by national and state interconnection regulations, and can be done only by qualified personnel.
- Cover the photovoltaic panels with dark opaque sheets before they are connected to avoid (prevent) any chance (possibility) of high voltages appearing at the connecting cable terminations.

GENERAL

During inverter operation, some parts can be powered, some not properly insulated and, in some cases, some parts can move or rotate, or some surfaces can be hot.
Unauthorized removal of the necessary protections, improper use, incorrect installation or incorrect operation may lead to serious damage to people and objects.
All transport, installation and start-up, as well as maintenance operations, shall be carried out by skilled and trained personnel (all national regulations on accidents prevention shall be complied with ! ! !).
According to these basic safety rules, qualified and trained people have skills for the assembling, start-up and operation of the product, as well as the necessary requirements and qualifications to perform such operations.

ASSEMBLY

Devices shall be assembled and cooled according to the specifications mentioned in the corresponding documents.
In particular, during transport and handling, parts shall not be bent and/or the insulation distances shall not be changed. There should be no contact between electronic parts and connection terminals.

Electrical parts must not be mechanically damaged or destroyed (potential health risk).

ELECTRICAL CONNECTION

With the inverter powered, comply with all prevailing national regulations on accidents prevention.
Electrical connections shall be carried out in accordance with the applicable regulations, such as conductor sections, fuses, PE connection.

OPERATION

Systems equipped with inverters shall be provided with further control and protective devices in compliance with the corresponding prevailing safety rules, such as those relating to the compliance with technical equipment, accident-preventing regulations, etc. Any calibration change shall be made using the operational software. Once the inverter has been disconnected from the power grid, powered parts and electrical connections shall not be touched as some capacitors could be charged.
Comply with all corresponding marks and symbols present on each device. During operation, make sure that all covers and doors are closed.

MAINTENANCE AND SERVICE

Comply with manufacturer's recommendations.

SAVE ALL DOCUMENTS IN A SAFE PLACE !

PVI-2000-OUTD-UK

This document applies to the above-mentioned inverters, only.

Fig. 1 - Product label

The identification plate present on the inverter includes the following data:

1) Manufacturer Part Number (11 digits)
2) Model Number
3) Serial Number
4) Production Week/Year

CONTENTS:

1 FOREWORD 9
1.1 PHOTOVOLTAIC ENERGY 9
2 SYSTEM DESCRIPTION 10
2.1 Main Elements of a PV System: "STRINGS and ARRAYS" 10
2.2 Data Transmission and Check 12
2.3 AURORA Technical Description 13
2.4 Protective Devices 14
2.4.1 Anti-Islanding 14
2.4.2 Panel Ground Fault 14
2.4.3 Further Protective Devices 15
3 INSTALLATION 15
3.1 Package Inspection 15
3.2 Package Check List 16
3.3 Choosing Installation Location 17
3.4 Wall Mounting 18
3.5 Preliminaries to Electrical Connections 21
3.6 Electrical connection 24
3.7 Acces to the terminal blocks by removing the right side panel 26
4 START-UP 27
5 MONITORING AND DATA TRANSMISSION 28
5.1 User's Interface Mode 28
5.2 Available Data 30
5.2.1 Real time data 30
5.2.2 Internally Logged Data 30
5.3 LED Indicators 31
5.4 Messages and Error Codes 36
5.5 LCD Display 38
6 DATA CHECK AND COMMUNICATION 44
6.1 RS-485 serial link 44
6.2 Power Line Modem (PLM) 47
6.3 Display Menu 49
6.4 Address information 50
6.5 Manual address setting 50
6.6 Baud Rate setting 51
6.7 Measurement accuracy 53
7 TROUBLESHOOTING 54
8 TECHNICAL FEATURES 56
8.1 Input Values 56

8.2 Output Values 59
8.3 Grid protection characteristics 59
8.4 General characteristics 60
8.5 Power Derating 61

1 FOREWORD

This document contains a technical description of the AURORA photovoltaic inverter so as to provide the installer and user all the necessary information about installation, operation and use of AURORA.

1.1 PHOTOVOLTAIC ENERGY

Industrialized countries (greater energy consumers) have been experimenting with energy-saving methods and reducing pollutant levels. This may be possible through a shrewd and rational consumption of well-known resources, and also by looking for new forms of clean and in exhaustible energy.
Renewable sources of energy are fundamental to solving this problem. Under these circumstances, solar energy exploitation to generate electrical (photovoltaic) energy is becoming more and more important worldwide.
Photovoltaic energy, in any case, is of great advantage to the environment because the radiated energy we receive from the sun is transformed directly into electrical energy without any combustion process and without producing any pollution.

2 SYSTEM DESCRIPTION

AURORA is an inverter able to feed energy to the electrical power distribution grid.
Photovoltaic panels transform the solar radiation into electrical energy in the form of direct (Dc) current (through a photovoltaic field, also known as PV generator). In order to utilize this energy and feed it back to the distribution grid, this energy shall be turned into alternating (Ac) current. AURORA does this conversion, also known as Dc to Ac inversion, in a very efficient way, without using rotating parts but just static power electronic devices.
When used in parallel with the grid, the alternate current generated by the inverter is directly fed to the domestic distribution circuit, which in turn is also connected to the public power distribution grid.
The solar energy system can thus feed power to all the connected users, such as lighting devices, household appliances, etc.
If the energy generated by the photovoltaic system is not enough, the energy necessary to ensure the standard operation of the connected users is drawn from the public power distribution grid. Any excess energy produced by the inverter is exported to the grid.
According to national and local standards and regulations the produced energy can be sold to the grid or credited to the user against future consumption.

2.1 Main Elements of a PV System: "STRINGS and ARRAYS"

The so-called "string" technology has been developed in order to reduce the installation costs of a photovoltaic system as much as possible. These costs are mainly related to the wiring operations on the Dc side of the inverter and the consequent distribution on the Ac side.
A photovoltaic PANEL is composed of many photovoltaic cells assembled on the same mount. A STRING is composed of a certain number of panels electrically connected in series. An ARRAY is composed of one or more strings connected in parallel.
Larger photovoltaic systems, can be composed of a certain number of arrays, connected to one or more AURORA inverters. By maximizing the number of panels in series per string, the cost and complexity of the system wiring can be reduced.

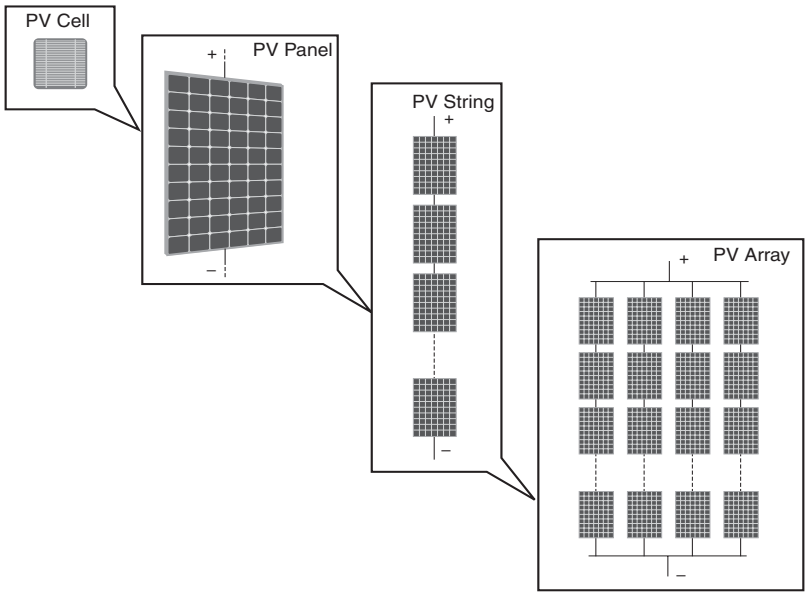


Fig.2 Array Composition

Array voltage value shall be within an acceptable range for the inverter. Please refer to the technical data for the AURORA for details on the Dc operating voltage range (see Section 8.1 "Input Values" for more details).

WARNING: String voltage shall not exceed 600Vdc for any reason, so as to avoid damage to the equipment.

NOTE: A minimum string voltage value of 200Vdc is required to start-up the grid connection sequence of AURORA. Once connected, AURORA will transfer to the grid the maximum power available from the string for any DC input voltage value in the range from 90Vdc to 580Vdc.

The total current of an array must also be within the capability limits of the inverter. The 2000W model of AURORA is capable of handling a single array. For AURORA the maximum input current shall not exceed 10Adc.
In case the photovoltaic system exceeds the capabilities of a single AURORA inverter, additional inverters can be added to the system, each connected to a suitable section of the photovoltaic field on the Dc side, and to the grid on the Ac side. Each AURORA inverter will work independent of the others and will transfer to the grid the maximum power available from its own section of the photovoltaic panels.
The actual decisions on the way the photovoltaic system is structured and wired depend on a number of factors and considerations, such as type and model of panels, available area, location, energy targets, as well as on good design practices. Power-One provides a system configuration tool on its website (www.power-one .com) that can assist in modeling the system.

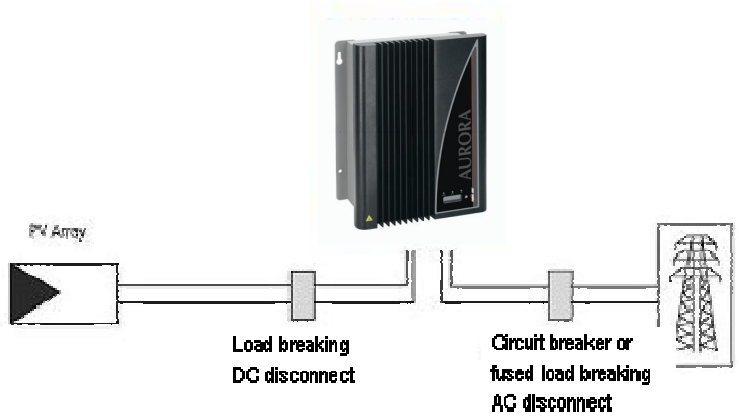


Fig.3 Simplified diagram of a photovoltaic system

2.2 Data Transmission and Check

In case multiple inverters are used, they can be monitored remotely by using an advanced communication system based on the serial interface RS485 or on the Power Line Modem (PLM) technology. For further information, refer to the corresponding sections of this manual.

2.3 AURORA Technical Description

Figure 4 shows a block diagram of AURORA. The main blocks are the input Dc-Dc converter (called booster) and the output inverter. Both the Dc-Dc converter and the output inverter work at high switching frequency to minimize size and weight.
This model of AURORA is transformer-less, that means that there is no galvanic isolation between input and output. This allows an increase to the inverter efficiency. AURORA is equipped with all the protection needed to operate safely and to comply with existing safety regulations even without an isolation transformer.

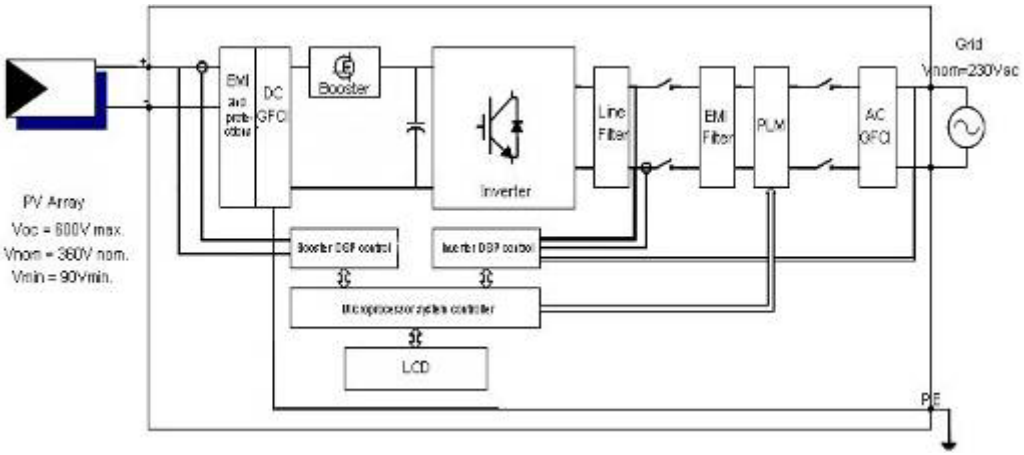


Fig.4 AURORA block diagram

Thanks to its high efficiency and large heat-sink, AURORA offers max. power operation over a wide ambient temperature range.
The inverter is digitally controlled by means of two independent Digital Signal Processors (DSP), and one microprocessor.
Two single-chip independent computers maintain control in full compliance with the electric standards relating to systems power supply and safety.

The AURORA operating system performs inter-process communication checks to ensure the entire unit operates properly.
This process ensures optimal performance levels of the whole unit, as well as a high efficiency under all solar radiation and load conditions, always in full compliance with the applicable directives, standards and regulations.

2.4 Protective Devices

2.4.1 Anti-Islanding

When the local power distribution grid is interrupted due to a fault or maintenance purposes, or when the equipment is shut down for maintenance operations, AURORA shall be physically disconnected under safety conditions, so as to protect the people working on the grid, in full compliance with the applicable prevailing national standards and regulations. To avoid any possible islanding operation, AURORA is provided with an automatic disconnection protective system called Anti-Islanding.
The AURORA PVI-2000-OUTD-UK model is equipped with an advanced Anti-Islanding protection certified according to:
- UK G83\1

2.4.2 Panel Ground Fault

This version of Aurora is designed for connection to floating Photovoltaic array only, with the positive and negative terminals from the panels are not connected to the Ground (the metallic support of the panel instead shall be connected to safety Ground in accordance with existing electrical safety regulations). An advanced ground fault protection circuit continuously monitors the ground connection and shuts down AURORA in case a ground fault is detected and indicates the ground fault condition by means of a red LED on the front panel. AURORA is equipped with a (chassis) ground screw clamp, which shall be used for connection of the plant Protective Earth conductor (equipment grounding conductor). See section 3.5 for detailed grounding instructions.

WARNING: Do not connect the AURORA inverter to Bi-polar configured arrays. The AURORA inverter is designed for connection to floating Photovoltaic arrays only.

NOTE: For detailed information on AURORA disconnection and on malfunctioning causes, refer to the corresponding sections.

2.4.3 Further Protective Devices

AURORA is equipped with additional protections to guarantee safe operation under all circumstances. The protections include:

- Continuous monitoring of the grid voltage to ensure the frequency and voltage values are within the proper operational limits;
- Control of the internal temperatures to automatically drive the speed of the external cooling fan. This will allow the inverter to deliver the maximum output power for ambient temperatures up +40 ° C

The AURORA is designed for safe and reliable operation. This is made possible by the use of redundant control circuits.

3 INSTALLATION

WARNING: The electrical installation of AURORA must be made in accordance with the electrical standards prescribed by the local regulations.

WARNING: The connection of AURORA to the electrical distribution grid must be performed only after receiving authorization from the utility that operates the grid.

3.1 Package Inspection

NOTE: The distributor presented your AURORA to the delivering carrier securely packed and in perfect condition. Upon acceptance of the package from the distributor the delivering carrier assumes responsibility for its safe arrival to you. Regardless of the attention paid by carrier in handling it, sometimes the package and its contents might be damaged.

Please, carry out the following checks:

- Examine the shipping box for any visible damage: punctures, dents or any other signs of possible internal damage;
- Describe any damage or shortage on the receiving documents and have the carrier sign their full name;
- Open the shipping box and inspect the contents for internal damage. While unpacking, be careful not to discard any equipment, parts or manuals. If any damage is detected, call the delivering carrier to determine the appropriate

action. They may require an inspection. Save all shipping material for the inspector to see!

- If the inspection reveals damage to the inverter call your supplier, or authorized distributor. They will determine if the equipment should be returned for repair. They will also provide instructions on how to get the equipment repaired;
- It is your responsibility to file a claim with the delivery carrier. Failure to properly file a claim for shipping damages may void warranty service for any physical damages later reported for repair;
- Save AURORA original packaging, as it will have to be used in case the equipment has to be shipped out for repairs, or the responsible inspector requires it.

3.2 Package Check List

Description	Quantity
Photovoltaic Inverter	1
Bag with 4 screws, 4 blocks and 1 Tap wrench Torx TX20. Connector kit including: 1 cable gland PG16,5 with 2 holes gasket, mating connector for (Binder) AC connection	1
One mounting reference drawing	1
One copy of this manual	1
One certificate of warranty	1
CD-Rom with communication software	1

3.3 Choosing Installation Location

The location for the installation of AURORA should be selected in accordance to the following recommendations:

- AURORA should be placed at a suitable height from ground to allow easy reading of the front display and the status LEDs.
- Leave enough room around the unit to allow easy installation and maintenance.
- Choose a location sheltered from sun radiation and able to provide some ventilation. Avoid locations where air cannot freely circulate around the unit, or directly exposed to the sun.
- Minimum clearance requirements on the sides to ease the access the side cover and to obtain the best performance of the unit are as per the following figure:

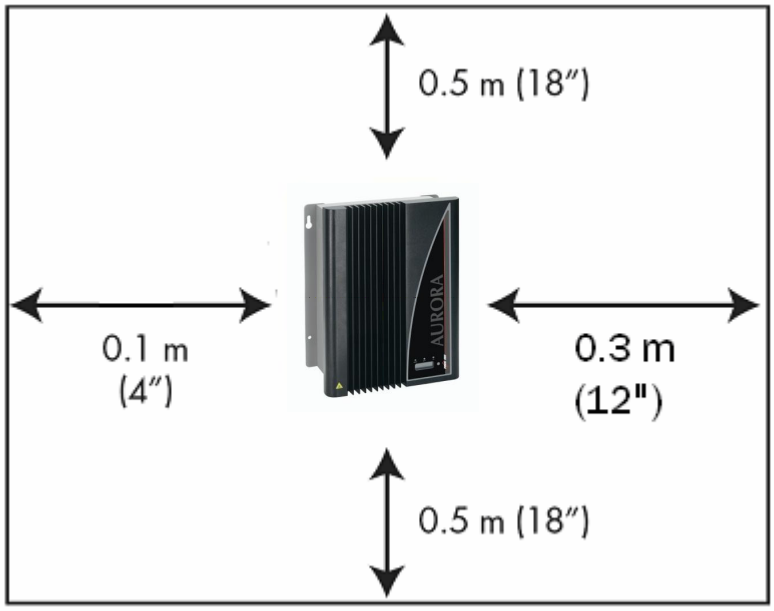


Fig.5 Minimum clearance requirements

3.4 Wall Mounting

AURORA should be mounted in a vertical position as shown in figure 7.

NOTE: AURORA ratings are based on a vertical mounting position. Although it is possible to mount AURORA in a tilted position, the thermal performance in that case may be de-rated. In any case avoid mounting AURORA with the front plate rotated, always make sure that the fins of the front heatsink are vertical.

To facilitate wall mounting a reference drawing is provided in the package (Fig.6). Use the drawing to locate the holes on the wall. A set of standard expansion stainless steel screws is included in the package for use in mounting the AURORA to a masonry wall. In case of different materials make sure to select the proper mounting hardware. Always use stainless steel mounting hardware, if the supplied hardware is not used.
The clearance hole in the mount bracket is 8 mm.

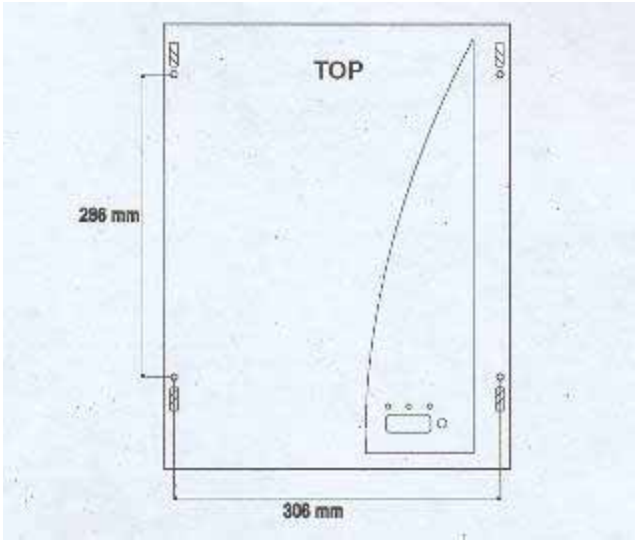


Fig.6 Wall mounting diagram

Install the expansion screws in the wall so that the head of the screws is about 4mm (~1/6") from the wall surface. Then hang AURORA on the wall by fitting the screw heads in the mounting slots as shown in Fig.7, and secure the screws.

Fig.7 AURORA wall mounting

It is possible to mount AURORA in a tilted position. In that case the thermal dissipation will not be optimized and the unit may derate the maximum output power at ambient temperatures below 40°C (see Fig. 9).

NOTE: In case of installation of several units, Power-one recommends not to install them in parallel, superimposed, rows.
In fact the heat generated by the bottom rows will get the ambient temperature of the upper inverters to increase. At ambient temperatures higher than + 40 °C an output power derating may occur on the top units.

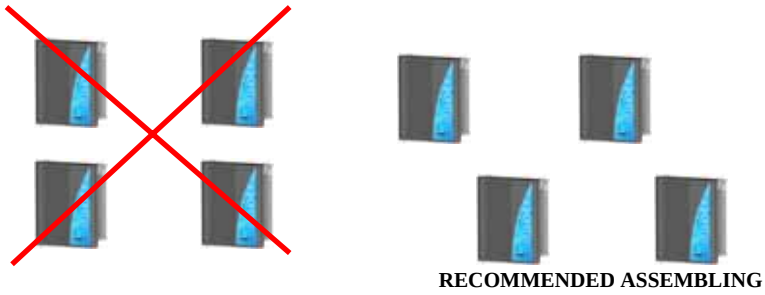


Fig.8 Aurora, recommended assembling

It is recommended that the unit is not placed in direct sunlight.

WARNING: During operation, inverter surface can reach very high temperatures.
DO NOT touch inverter surface to prevent the risk of burns.

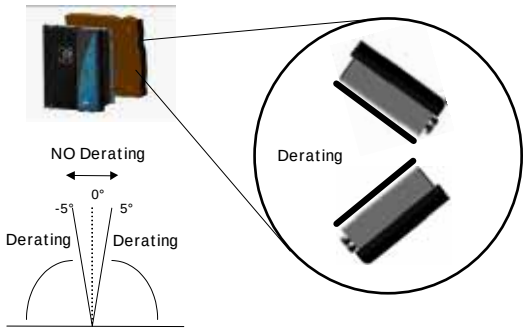


Fig.9 Inverter tilted mounting

3.5 Preliminaries to Electrical Connections

WARNING: The electrical connections can be done only after AURORA is firmly mounted to the wall.

WARNING: The connection of AURORA to the electrical distribution grid must be performed only by skilled operators and after having received authorization from the utility that operates the grid.

WARNING: For further details on each single step, carefully read and follow the "step-by-step" instructions of this section (and sub-sections), as well as all safety warnings. Any operation non-complying with the instructions below can lead to operator/installer hazards and to equipment damage.

WARNING: Always respect the nominal ratings of voltage and current defined in chapter 8 (Technical Characteristics) when designing your system. In particular, regarding the photovoltaic system:

- Maximum Dc array input voltage to MPPT circuit: 600Vdc in any condition.
- Maximum Dc array input current for MPPT circuit: 10Adc in any condition.

WARNING: Make sure that your installation design is in compliance with national wiring methods and local standard regulations, if more stringent.

WARNING: Carefully protect the photovoltaic panels from the sun radiation (preferably with dark film or tissue) during the installation procedure. The protection must be removed once the installation is completed.

NOTE: The inverter shall be connected ONLY to a dedicated branch circuit. According to the typical assembly diagram (see Fig.10) the array must be connected to a Dc disconnect. An AC disconnecting mean with overcurrent protection must be used to connect AURORA to the grid. Recommended ratings for the Ac overcurrent protection device is 10A, 240V.

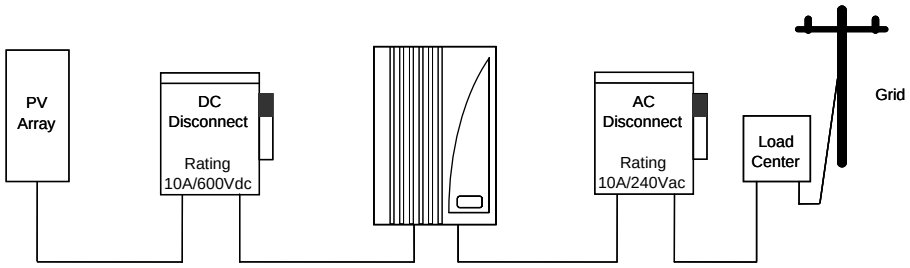


Fig.10 General wiring diagram

CAUTION: To reduce the risk of fire, connect only to a circuit provided with 10A maximum branch circuit overcurrent protection.

WARNING: Always open the AC disconnect breaker before to open the DC disconnect.

WARNING: All power wires connecting AURORA must have a section of at least 14 AWG (2.5mm^2) and must be able to operate at temperature of at least 90 °C.
The wire size may need to be increased due to temperature, wire length and conduit fill factors. The wiring should be rated for wet location, UV sunlight-resistant and outdoor location. Consult with a qualified electrical designer when determining system wiring.
For PV modules connection: unipolar stranded wire FG7(0)R, or H07RNF cable with a copper section of 4 or 6 mm^2 and external jacket max. diameter of 8,9mm.
AC mains connection: 3x stranded wire FG7(0)R with copper section 2,5; 4; or 6 mm^2 and external jacket max. diameter of 16,2mm.

The AURORA must be installed using watertight wiring methods.

The connections available on the bottom of the inverter, from left to right (see Fig. 11):

- 1 watertight cap. This cap can be replaced by the PG16,5 cable gland supplied with the inverter to route the signal cable for RS485 serial link.
- 1 Binder type connector for AC mains connection.
- 1 pair of Multicontact connectors, for the connection of the PV array (IN1).
- 2 watertight caps seal off the "IN2" inputs (only available on PVI-3600 models)

.

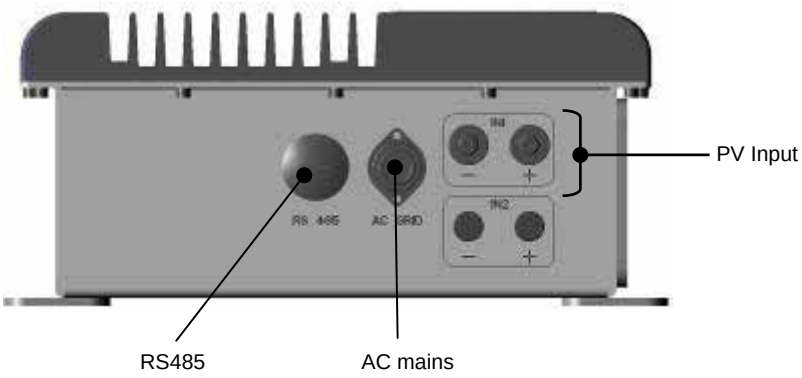


Fig.11: Connections – Bottom side

WARNING: When making the electrical connections follow this exact procedure to avoid exposure to dangerous voltages. Each step of the procedure is explained in the following paragraphs.
To disconnect AURORA always open the AC breaker first and then also the DC breaker prior to do any further operation and before removing the AC and DC connections to the inverter.

3.6 Electrical connection

Step 1/5: Open the Ac disconnect switch or circuit breaker and lockout the Ac disconnecting means.

Step 2/5: Open the Dc disconnect switch of the Photovoltaic array

Step 3/5: Verify there is no voltage on the connection terminals.

Step 4/5: Connect AURORA to the Ac disconnect switch or circuit breaker

WARNING: Use proper, low impedance cables to connect AURORA to the Ac disconnect or circuit breaker, and between the disconnecting means to the grid. To ensure proper operation the impedance seen at the Ac output terminals of AURORA must be below 1ohm.

WARNING: AURORA inverter shall be connected to the Ac disconnect or circuit breaker through a three wire cable: one conductor for the phase, one for the neutral and one (green/yellow) for the ground connection (Protective Earth PE).

1) Mount the cable between AURORA and the Ac disconnect
2) Connect the AC cable to the Binder mating connector supplied with the unit. Follow the markings stamped on the plastic housing at each terminal (as illustrated in Fig. 12): terminal 1 for Neutral, terminal 2 for Line, terminal 3 not connected, and the terminal marked with the symbol ⏚ for the Protective Earth (PE) connection.
3) Connect the Binder connector to AURORA

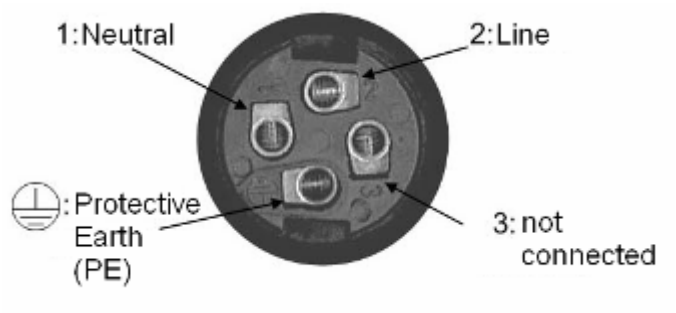


Fig. 12 Binder Connector

WARNING: carefully respect the Phase and Neutral connection position (do not reverse it!) as this may impact on the safety of the system and lead to malfunctioning of the inverter**.**

NOTE: In case your system has an additional kW-hour meter installed between the Ac disconnect and AURORA, please apply the Ac connection procedure to the terminals of the meter.

Step 5/5: Connect AURORA to the Dc disconnect switches

Power-One recommends to check that the PV array does not exceed the maximum current capability of the AURORA input section (10Adc).

WARNING: Take special care to ensure the photovoltaic voltage polarity corresponds to the symbols "+" and "-" labeled on the contacts of the photovoltaic field.
Before connecting AURORA with the photovoltaic field, Power-One recommends checking, using a proper gauge, that the polarity value and the allowable voltage value between positive and negative contacts are correct.

Follow the procedure included below to complete the array wiring:

1) Wire the positive conductor from the DC disconnect to the inverter.
2) Connection to the inverter AURORA shall be done with the suitable watertight mating connectors from Multicontact (dia. 3mm series, NOT included in the package)
3) Connect the positive cable to AURORA
4) Wire the negative conductor from the DC disconnect to the inverter.
5) Terminate the cable with a Multicontact mating connector (NOT included in the package)
6) Connect the negative cable to AURORA

3.7 Access to the terminal blocks by removing the right side panel

WARNING: To avoid the risk of electric shock from energy stored in capacitors. Wait 5 minutes after disconnecting both Ac and Dc connections before opening the side panel.

To remove the side panel unscrew it using the Torx TX20 wrench supplied with the inverter kit.

Fig.13: Removing the side panel

WARNING: after operation the side panel screws shall be tightened with a torque of 1.5 Nm (13.2 in-lbs) to ensure watertight sealing.

4 START-UP

NOTE: do not lay any object on AURORA during operation.

WARNING: do not touch the heatsink during operation, some parts could be very hot and cause serious burns.

To start up AURORA switch the external Dc disconnect on the ON position.

1) Switch the Ac disconnect to the ON position.
2) AURORA will start operating and the green LED labeled Power on the front panels will start blinking while the grid is checked to make sure that voltage, impedance and frequency parameters are within operating range per UK G83\1 requirements. The check can last a few minutes depending on the conditions of the grid. During the check the LCD display will show a sequence of three screens, indicating:
   - Remaining time for next connection.
   - Grid voltage value and status (in or out of range)
   - Grid frequency value and status (in or out of range)
3) If the grid check is successfully completed the unit will perform a protective test on the unit. It's normal that the unit produces an audible sound during the test.
4) Then the AURORA will export to the grid and the green Power LED will be continuously lit (provided there is enough solar radiation to feed power to the grid).
5) If the grid check is not successful the unit repeats the check over and over again until acceptable grid parameters are found. During this procedure the green power LED keeps blinking. Measure the grid voltage and frequency and then verify the grid configuration of the unit.

5 MONITORING AND DATA TRANSMISSION

5.1 User's Interface Mode

WARNING: **RS-485 cable must ensure a protection and insulating voltage rating of at least 600V.**

The AURORA inverter usually works automatically and is maintenance-free.
When solar radiation is not high enough to provide power for export to the grid (during nighttime, for example) AURORA disconnects automatically, and enters the stand-by mode, waiting to start working again. The operational cycle is automatically restored as soon as the solar radiation is enough.

AURORA inverter can provide operational data in the following ways:

- LED indicators
- Operational data on the LCD display
- Data transmission on a dedicated serial RS-485 line. The data can be collected by a PC or data logger equipped with a suitable RS-485 port or with the optional RS-485/RS-232 AURORA serial interface converter, or by AURORA Easy Control data logger.
- Data transmission on the Ac grid by means of a dedicated Power Line Modem (PLM). The data can be collected by a PC equipped with the optional PLM adapter., or by AURORA Easy Control data logger.

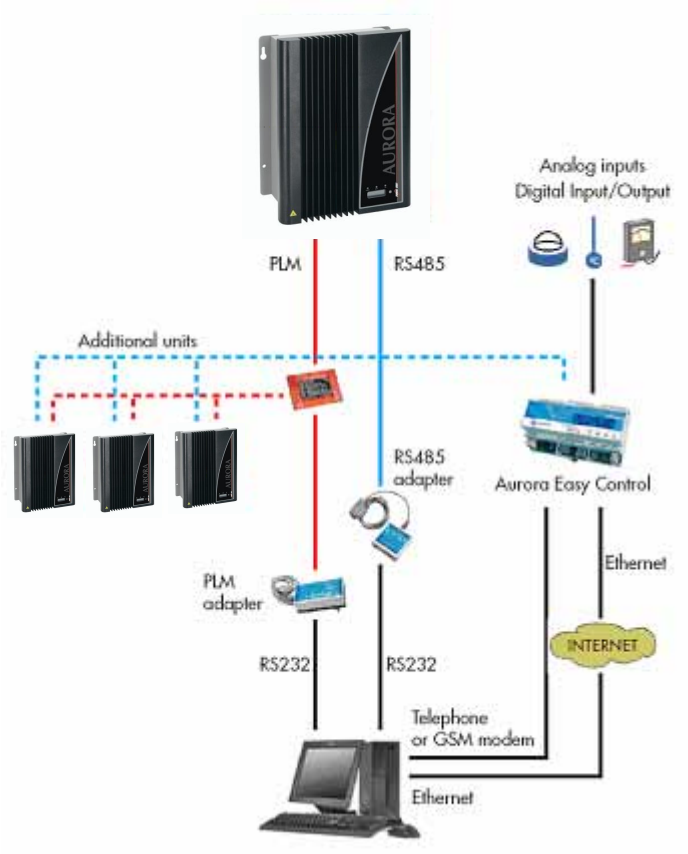


Fig. 14 Data Transmission Options

5.2 Available Data

AURORA provides two sets of data that are accessed using AURORA interface software.

5.2.1 Real time data

The real time operating data can be transmitted on request over the communication lines and is not recorded internally by the AURORA inverter. The AURORA interface software (AURORA Communicator) can be used to retrieve and store data on a PC computer.

The following data is available:

- Grid voltage
- Grid current
- Grid frequency
- Power transferred to the grid
- PV array Voltage
- PV array Current
- Heatsink temperature
- Serial Number Part Number
- Manufacturing week
- Firmware revision code
- Energy produced so far in the day
- Leakage Current

5.2.2 Internally Logged Data

AURORA stores internally the following data:

- Lifetime counter of grid connection time
- Lifetime counter of energy transferred to the grid
- Energy transferred to the grid every 10 seconds for the last 8640 periods of 10 seconds (which on average cover more than 2 days logged data)
- Partial counter of grid connection time (the counter start time can be reset by using the AURORA software)
- Partial counter of energy (uses the same start time of the partial time counter)

- Last 100 fault conditions with error code and time stamp
- Last 100 variations to the grid connection parameters with parameter code, new value.

All data are available for transmission via the RS-485 link or PLM. In addition, the first two data of the list are displayed on the LCD. The AURORA Communicator software shall be used in order to download the internally stored data.

5.3 LED Indicators

On the front panel of the AURORA inverter there are three LEDs, which give status indications:

1. A green LED labeled "Power" to signal AURORA normal operation. When the unit is started-up, during grid parameter's check-up, this led is blinking. If a "valid" grid voltage is detected the LED lit on permanently in case there is enough solar radiation. Conversely the green LED keeps blinking until solar radiation exceeds a minimum threshold value to ensure inverter activation and power export to the grid. During this phase the LCD shows the message "Waiting Sun…"

2. A yellow LED labeled "FAULT" to signal that AURORA have detected a fault condition. The Fault condition (or error code) is displayed on the front LCD

3. A red LED labeled "GFI" (ground fault) to signal that AURORA have detected a ground failure in the DC section of the photovoltaic system. When a ground fault is detected AURORA immediately disconnect from the grid and the LCD displays the corresponding error message. AURORA remains in this status until the operator push the "ESC" button (# 4) in order to restart the grid connection sequence. However if the inverter is not able to resume the grid connection, please call the technical assistance to identify and remove the failure.

Fig.15 LED's location

The following table summarize all the possible LED activation configurations related to each AURORA inverter operating status.

KEY:

LED on

LED blinking

LED off

Any of the above conditions

	LEDs Status	Operational Status	Remarks
1	Power (Green): ☒ Fault (Yellow): ☒ GFI (Red): ☒	AURORA self-disconnection during nighttime	Input voltage below 90 Vdc for both inputs
2	Power (Green): ◪ Fault (Yellow): ☒ GFI (Red): ☒	AURORA initialization, load settings and waiting for grid check	Input voltage above 200 Vdc also for one input only. It is a transition status while operating conditions are checked.
3	Power (Green): ■ Fault (Yellow): ☒ GFI (Red): ☒	AURORA is exporting to grid	Standard machine operation (search of max. power point or constant voltage).
4	Power (Green): □ Fault (Yellow): □ GFI (Red): ■	System insulation device faulty	Ground leakage found
5	Power (Green): ☒ Fault (Yellow): ■ GFI (Red): ☒	Malfunction – fault!!!	The Fault can be inside or outside the unit. See the alarm message appearing on the LCD.
6	Power (Green): ☒ Fault (Yellow): ◪ GFI (Red): ☒	Installation phase: AURORA is disconnected from grid.	During installation, it refers to set-up of the address for RS-485 communication.
7	Power (Green): ◪ Fault (Yellow): ■ GFI (Red): ☒	AC mains voltage is missing	The AC voltage is not present (i.e. AC disconnect switch or circuit breaker are OFF, or AC wiring is missing/wrong)

NOTE: All inverter statuses signaled by the corresponding LED coming on or blinking, are also identified on AURORA LCD by a message relating to the operation being carried out or to the defect/fault found (see following sub-sections).

G ☒ **Y** ☒ **R** ☒ **1) Night-time Mode**

AURORA is in the nighttime disconnection phase; this happens whenever the input power is too low to export power to the grid and power the inverter control system as well.

G ◪ **Y** ☒ **R** ☒ **2) AURORA Initialization and Grid Check**

The unit is in the initialization phase: energy supply for the inverter control system is high enough. AURORA is also checking that starting conditions – such as input voltage, starting time, etc. - necessary for the initialization process, are satisfied. Grid check is then started.

G ■ **Y** ☒ **R** ☒ **3) AURORA Under Production**

Once all electronic and safety self-tests are successfully completed, the unit starts the exporting process.
As stated above, during this phase AURORA carries out an automatic search and analysis of the photovoltaic field max power point tracking (MPPT).

G □ **Y** □ **R** ■ **4) Ground Insulation**

The inverter signals a ground fault.
This can be due to an insulation defect on the photovoltaic field connection (ex. Insulation resistance too low)

- *Insulation Defect*

  An insulation fault condition has been detected in the photovoltaic field or in the corresponding connection: a connection is conductive with the grounded potential.

WARNING: trying to remove the fault by yourself is extremely dangerous. The instructions below have to be followed very carefully. In case you are not experienced or skilled enough to work safely on the unit, contact a specialized technician.

What to do after an insulation defect has been found

Whenever the red LED comes on, press the special multifunction push-button next to the LCD side to reset it. If this fault can be reset, the AURORA will continue working because the fault was

most probably a temporary reduction of the insulation resistance (for example the water seepage on the modules caused by condensation). It is recommended to call qualified personnel to perform an inspection of the installation in case this disconnection events are recurrent. If the fault cannot be reset, that is causing a ground fault or there is some other insulation breakdown.
If the signal cannot be reset, insulate AURORA on both Dc and Ac sides so as to reach a safe condition; then contact an authorized center for repairing the fault.

G ☒
Y ■
R ☒

5) Malfunction-Fault Signal
Every time AURORA check system detects an operative malfunction or fault, the yellow LED comes on and a message showing the type of problem found appears on the LCD.

G ☒
Y ◪
R ☒

6) RS-485 Address Setting Signal
During installation, the yellow LED will flash until the address is confirmed. For further information about setting the address, refer to chapter 6.3.

G ◪
Y ■
R ☒

7) AC grid voltage missing
When the system is normally activated and operating, if for any reason there is a permanent loss of mains the inverter will signal this fault status with the yellow LED on and green LED blinking. This fault may be caused by a defective automatic circuit breaker or a fault in the AC wiring to the inverter or a system fault in the AC network.

5.4 Messages and Error Codes

The system status is identified through message or error signals appearing on the LCD.
The tables below summarize the two types of signals that can be displayed.

MESSAGES identify the AURORA actual status; so they do not relate to faults and nothing has to be done. The message will disappear as soon as standard conditions are restored (see codes with "W" suffix)

ERRORS identify a possible fault of the equipment or of the connected parts. The signal will disappear as soon as the causes are removed, except for the ground insulation fault. Usually, when an error signal appears, an action is needed. This action will be managed as much as possible by AURORA or, in case this is not possible, AURORA will supply all the necessary information to assist the person fixing the fault on the equipment or system.

Message	*Warning Type*	Error Type	Description
Sun Low	*W001*	//	*Input Voltage under threshold*
Input OC	//	*E001*	*Input overcurrent*
Input UV	*W002*	//	*Input Undervoltage*
Input OV	//	*E002*	*Input Overvoltage*
Internal Error	//	*E003*	*SW error*
Bulk OV	//	*E004*	*Bulk overvoltage*
Internal Error	//	*E005*	*Communication Error*
Out OC	//	*E006*	*Output overcurrent*
Internal Error	//	*E007*	*IGBT saturation*
Internal Error	//	*E008*	*Bulk undervoltage*
Internal Error	//	*E009*	*Internal Error*
Grid Fail	*W003*	//	*Grid Parameters Out of Range*
Internal Error	//	*E010*	*Bulk Low*
Internal Error	//	*E011*	*Ramp Fail*
DC/DC Fail	//	*E012*	*DcDc error revealed by inverter*
Not used on this model	//	*E013*	*---*
Over Temperature	//	*E014*	*Overtemperature*
Capacitors Fault	//	*E015*	*Bulk Capacitor Fail*
Inverter Fail	//	*E016*	*Inverter fail revealed by DcDc*
Internal Error	//	*E017*	*Start Timeout*

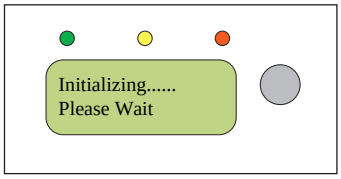
Message	*Warning Type*	**Error Type**	**Description**
Ground Fault	*//*	*E018*	*I leak fail*
Internal Error	*//*	*E019*	*leak Sensor fail*
Internal Error	*//*	*E020*	*Inverter Relay Fail*
Internal Error	*//*	*E021*	*DC DC Relay Fail*
Internal Error	*//*	*E022*	*Autotest Timeout*
Internal Error	*//*	*E023*	*Dc-Injection Error*
Grid OV	*W004*	*//*	*Grid overvoltage*
Grid UV	*W005*	*//*	*Grid undervoltage*
Grid OF	*W006*	*//*	*Grid overfrequency*
Grid UF	*W007*	*//*	*Grid underfrequency*
Z Grid HI	*W008*	*//*	*Z Grid out of range*
Internal Error	*//*	*E024*	*Internal Error*
----------	*//*	*E025*	*Riso low (log only)*
Internal Error	*//*	*E026*	*VRef Error*
Internal Error	*//*	*E027*	*VGrid Measures error*
Internal Error	*//*	*E028*	*FGrid Measures error*
Internal Error	*//*	*E029*	*ZGrid Measures error*
Internal Error	*//*	*E030*	*ILeak Measures error*
Internal Error	*//*	*E031*	*Wrong V Measure*
Internal Error	*//*	*E032*	*Wrong I Measure*
Fan Fail	*W010*	*//*	*Defective Fan (log only)*
Internal Error	*//*	*E033*	*Undertemperature*

5.5 LCD Display

The 2-line LCD display is located on the front panel and shows:

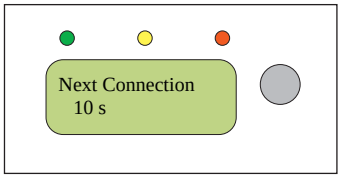
- ✓ the status of the inverter and statistical data;
- ✓ service messages for the operator;
- ✓ messages of faults or damages found.

Data are shown cyclically, the screens change every 5 seconds. On the right of the display there is a button that when pressed freezes the screen. Pushing the button again unfreezes the screen. When AURORA is turned on the display shows the following screen for about 10 seconds:

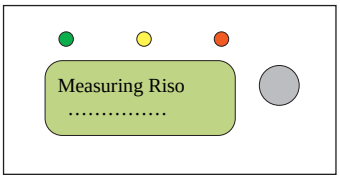


Afterwards it begins to check the grid. While checking the grid the display shows the three following screens cyclically:

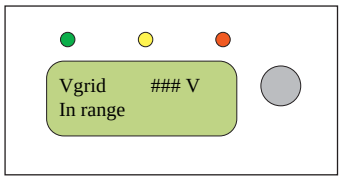
- ✓ This screen shows how many seconds are left before a new grid connection attempt will start.



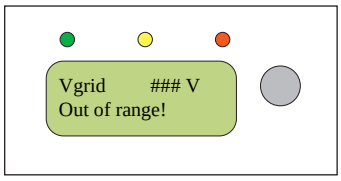
- ✓ The following screen shows the measured value of the insulation resistance:



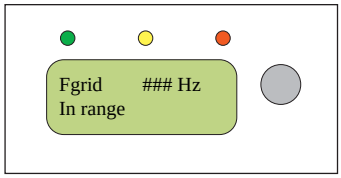
✓ This screen shows the grid voltage and the related status (in range or out of range).



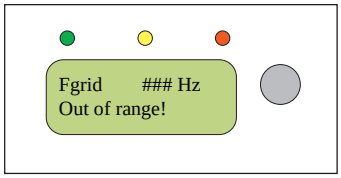
or



✓ This screen shows the grid frequency and the related status (in range or out of range, see section 9 for further details)

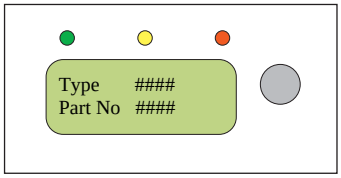


or

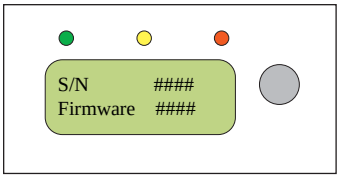


After AURORA is connected to the grid the display starts showing cyclically the following information screens, each for 5 seconds:

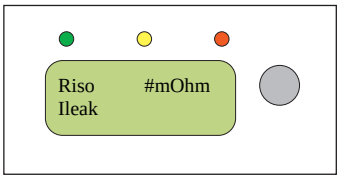
✓ First screen: Type and Part Number



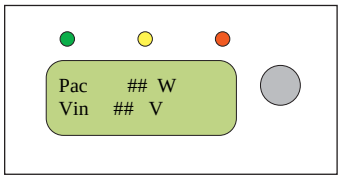
✓ Second screen: Serial Number and Firmware release number



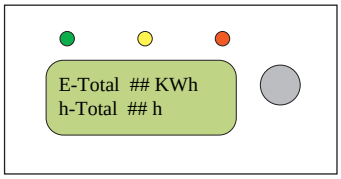
✓ Third screen: measured insulation resistance and leakage current value.



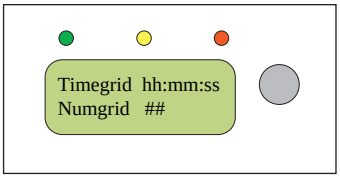
✓ Fourth screen: Output power and Voltage Input from the photovoltaic array



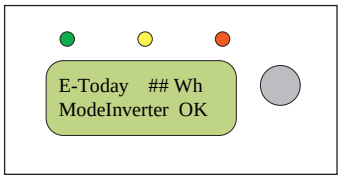
✓ Fifth screen: Total energy exported to the grid (E-Total) and total operating time (h-Total, that is time during which the unit was active). Both data are measured since the unit was first operated.



✓ Sixth screen: Time during which the unit exported energy to the grid (Timegrid) and number of times that unit connected to the grid (Numgrid).

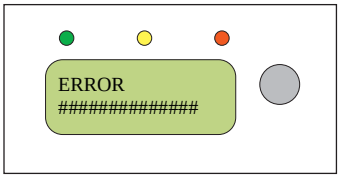


✓ Seventh screen: Daily energy (E-Today) and mode of operation of the inverter (ModeInverter)

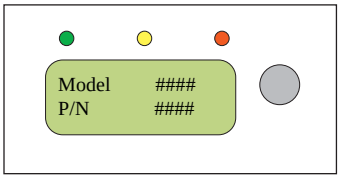


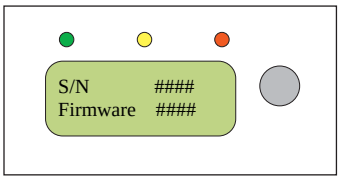
In case the inverter is not working properly the Fault or Ground Fault LEDs will turn on as described in paragraph 5.3, and the following three screens scroll on the LCD remaining on for 5 seconds. They contain important information that should be communicated to service personnel and will show cyclically on the LCD, each for 5 seconds:

✓ This screen shows the code of the error found, for further information refer to chapter 5.4.

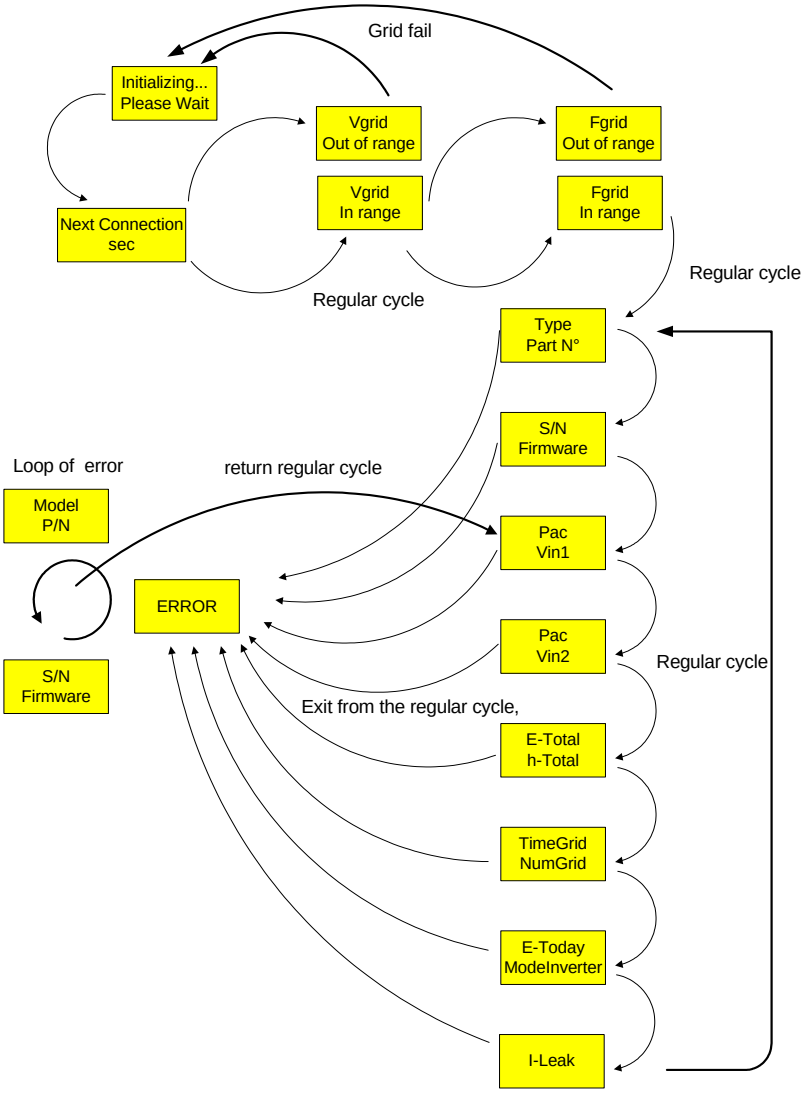


✓ These screens show the serial number and the firmware release number





The sequence of the screens is summarized in the following figure:



The values that can be displayed on the previous screens are summarized in the table below:

Data	Description
Vin	Input voltage from photovoltaic array 1
Pac	Output Ac power
E-Total	Total energy transferred to the grid since the unit was first operated
E-Today	Total energy exported to the grid today
h-Total	Total time since the unit was first operated
Type	Type of AURORA
S/N	Serial Number
Part No	Part Number
Firmware	Firmware release number
TimeGrid	Time during which the unit exported energy to the grid
NumGrid	Number of connections to the grid
Leakage	Leakage current

6 DATA CHECK AND COMMUNICATION

6.1 RS-485 serial link

The RS-485 link uses two wires for signals plus a third wire for signal grounding, which is different from the equipment grounding of the unit. The wires must be run in a watertight conduit through the bottom of the unit as explained in paragraph 3.5 after removing the watertight cap and installing a suitable watertight conduit connector. A gasket with 2 holes is supplied together with the watertight conduit (cable gland PG16,5) in case multiple units are connected on the same RS485 link through a daisy chain. In case a single wire is used please stop the 2nd hole with the small white plug included in the kit. The wires are then run to the RS-485 screw terminal blocks that is located in the internal compartment and is accessible by removing the right side panel. Please refer to paragraph 3.7 for further details on the correct procedure to remove and reposition the side panel. RS485 connections shall be done as illustrated in Fig. 16:

- Signal wires must be connected to +T/R and –T/R terminals
- Grounding wire must be connected to the RTN terminal

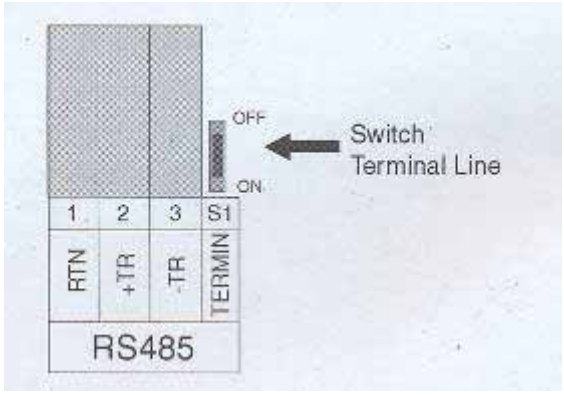


Fig.16: The RS-485 serial link terminal blocks

The single AURORA has a default address is two (2) and the S1 dip switch is in the OFF position (pushed away from the side access panel). The RS-485 address does not have to be configured for the single AURORA inverter.

Up to 31 AURORA inverters can be connected on the same RS-485 line. The maximum recommend RS-485 cable length is 1300 yards (1200 m).
In case multiple inverters are daisy-chained to the same RS-485 line, then the last unit must be terminated by changing the position of the dip-switch shown in Fig.19 from OFF to ON. The default position of the switch is OFF. Also, each unit must have a different address. See par. 6.5 to change the addresses.
In order for the RS485 communication line to perform the best, Power-One recommends to connect its PVI-RS232485 adapter before the first unit of the daisy-chain (see fig. 17 for details)
Equivalent devices may also be used for the same purpose, but they have not been tested therefore Power-One cannot grant the right functionalities.
Please also note that ordinary commercial adapters may need additional impedance termination. Aurora PVI-RS232485 adapter DOES NOT.
The following diagram shows how to connect multiple units on the same RS-485 bus.

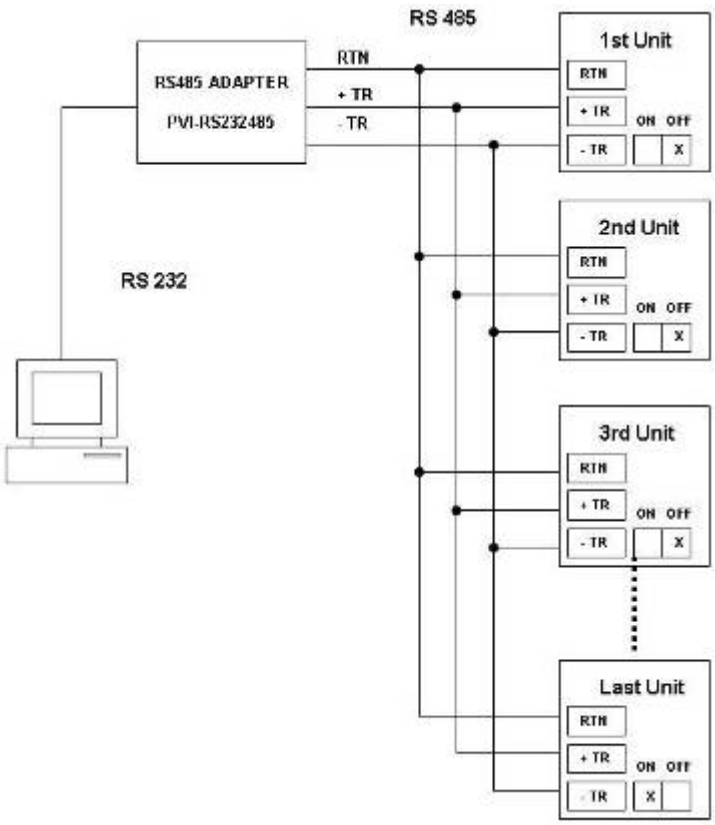


Fig.17 Multiple units connection

NOTE: up to 31 inverters can be connected to the same RS485 serial link. Although any address in the range from 2 to 63 can be selected, we recommend to set the inverter addresses in the range 2 to 33 for the RS485 serial link.

NOTE: if one or more inverters are added to the serial link, do not forget to restore the OFF position on the inverter that was the last in the chain before the addition of the new inverters.

6.2 Power Line Modem (PLM)

An optional Power Line Modem card can be integrated in the AURORA inverter. This system allows to transmit and receive the data directly from the AC mains cable, using advanced algorithms to improve communication performance and increase reliability of data transmission over noisy electrical lines.
To collect the data transmitted over the PLM link:
• Use a PLM/RS232 interface converter such as model number PVI-PLMREC-EU to connect to a PC,
In either case no additional physical connections between the inverter and the receiver are needed, as the communication uses the power lines.
In case of installations in buildings wired with three-phase systems please make sure that the AURORA inverter and the receiving equipment are both on the same phase.
The nominal transmission range is 300yards (about 300m). However, the range may be limited in case of high electromagnetic interference of the power lines. In case of extremely noisy power lines we recommend using a separate set of wires dedicated to the PLM communication, or to use the RS-485 serial link.
The maximum transmission rate of the PLM is 2400 bps.

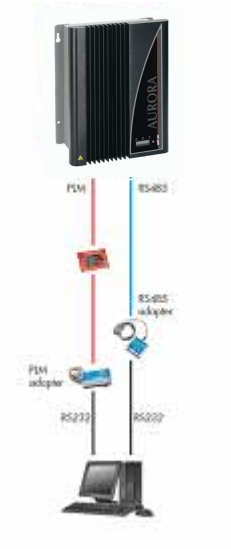


Fig.18: Data transmission to a PC

NOTE: the maximum number of inverters that can be connected via PLM is 63.

NOTE: It is not possible to have more than one receiving equipment such as AURORA Easy Control data logger or AURORA PLM/RS232 interface box connected to the same transmission line.

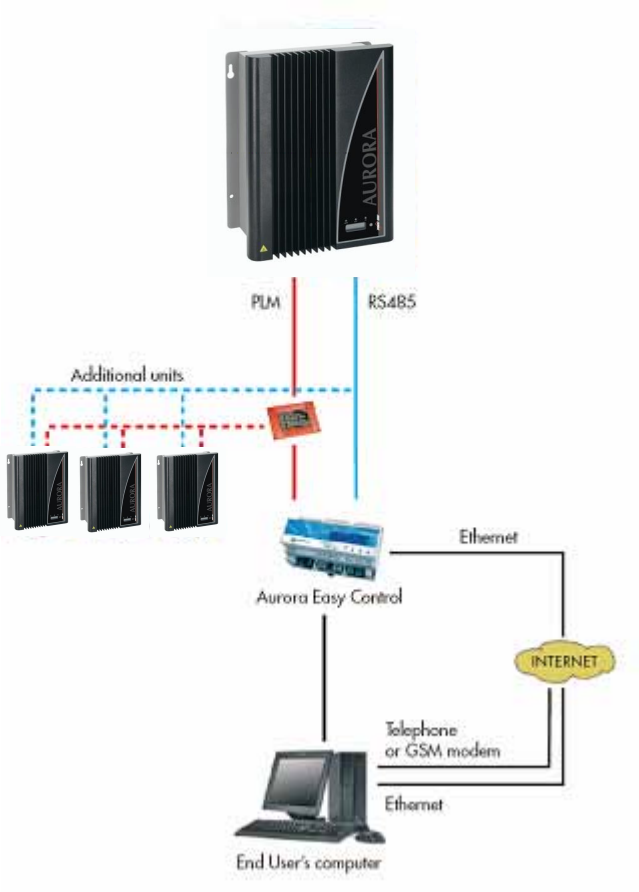


Fig.19: Data transmission to AURORA Easy Control

6.3 Display Menu

When using PLM or the RS-485 serial link communication each unit must have a unique address. The default address of each unit is 2. When connecting multiple units on the same serial or PLM link a new address needs to be assigned to each unit to avoid communication errors.

6.4 Address information

Addresses 0 and 1: are reserved for the host computers and monitoring accessories like the PLM modem and Easy Controller display unit.
The RS-485 serial link uses addresses 2 through 32
The PLM link uses addresses 2 through 64

6.5 Manual address setting

Use the following procedure to set the new address:

1) Press the key on the side of the LCD display button for at least 5 seconds
2) AURORA disconnects from the grid, the yellow LED begins to blink and the display shows:

3) Press the key as many times as needed to select the address between 2 and 63. After the 63 the address starts back from 0.

WARNING: Do not use the "AUTO" address. The automatic setting of the addresses through this key is a procedure reserved exclusively to installers and qualified personnel as it requires the use of a specific software.

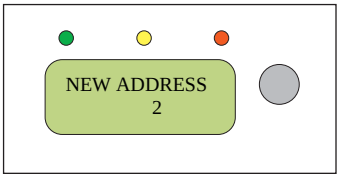
4) Confirm the choice by pressing once more the key for at least 5 seconds. After the confirmation AURORA connects again to the grid.

NOTE: When using RS-485 link there can be no more than 31 inverters connected on the same link. Although you are free to choose any address between 2 and 63 it is recommended that you use addresses between 2 and 32 for the RS-485 serial link.

NOTE: When using RS-485 link, in case one or more inverters are later added to the system, please remember to switch back to the OFF position the dip-switch of the former last inverter of the system.

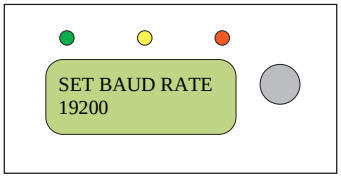
6.6 Baud Rate setting

1) After the inverter address have been defined according to the procedure included in paragraph 6.5 or 6.6, if the button at the right side of the LCD is pushed continuously for at least 5 sec and then released the display menu enters in the Baud Rate setting.

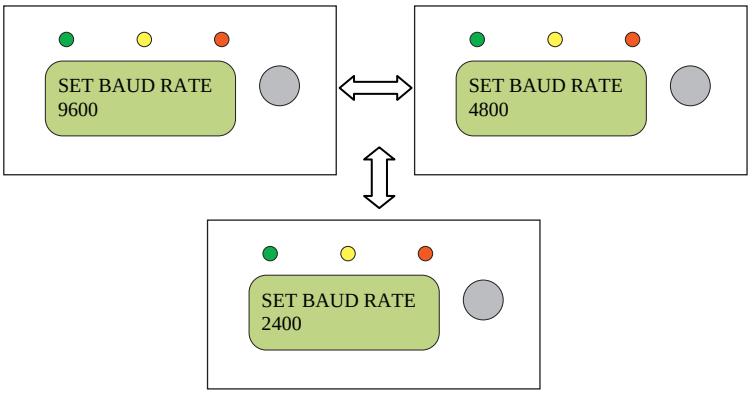


3) The display will show the wording "SET BAUD RATE" and the default baud rate setting of: 19200

4) To confirm the baud rate setting displayed just push the button firmly for another 5 sec period.



5) conversely to show the other baud rate setting options just shortly push the button



6) To confirm the selected baud rate that appear on the display keep the button firmly pushed for at least 5 sec.

WARNING: In general the standard baud rate is at 19200. Only in case of long distance or noisy transmission lines it is recommended to slow down the baud rate.

6.7 Measurement accuracy

All measurement devices are affected by errors.
For each reading the following table shows:

- Description and Unit of Measure
- Resolution and Accuracy

	Variable Name	Unit	Resolution		Maximum Error (%)
			Display	Measure	
PV Input Voltage	VP	Vdc	1 V	600mV	2%
PV Input Current	IP	Adc	0.1 A	15mA	2%
PV Input Power	Pin	W	1 W	10W	2%
Output Voltage	Vout	V	1 V	-	2%
Output Current	Iout	A	0.1 A	-	2%
Output Power	Pout	W	1 W	-	2%
Frequency	Freq	Hz	0,01	0,01	0,1%
Cumulated Energy	Energy	Wh	1 Wh		4%
Time counter	Lifetime	hh:mm:ss	1 s		0,2
Partial time counter	Partial Time	hh:mm:ss	1 s		0,2

7 TROUBLESHOOTING

AURORA inverters comply with standards set for grid-tied operation, safety and electromagnetic compatibility.

Before being delivered by Power-One, the product has been successfully subjected to several tests to check: operation, protective devices, performance and durability.

All these tests, together with the system ensuring Power-One quality, guarantee AURORA optimal operation.

In case of any possible malfunction of the photovoltaic system, try to solve the problems as follows:

- ✓ Working under safe conditions, as stated in chapter 3.5, check that connections between AURORA, the photovoltaic field and power distribution grid have been made correctly.

- ✓ Carefully observe which LED is blinking and read the signal appearing on the display; then, following the instructions given in chapters 5.3 and 5.4, try to identify the type of fault found.

If the malfunction cannot be removed by following these instructions, contact the service center or the installer (see following page).

Before contacting the service center, keep the following information handy:

INFO AURORA

NOTE: Information to be found directly on LCD

- ✓ AURORA model?
- ✓ Serial number?
- ✓ Week of production?
- ✓ LED flashing?
- ✓ Light blinking or steady?
- ✓ Signal displayed?

- ✓ Malfunction short description?
- ✓ Can malfunction be reproduced?
- ✓ If so, how?
- ✓ Does malfunction appear cyclically?
- ✓ If so, how frequently?
- ✓ Is malfunction present from installation?
- ✓ If so, has it worsened?
- ✓ Description of the atmospheric conditions when the malfunction appeared.

INFO on the Photovoltaic Field

- ✓ Make and model of photovoltaic panels
- ✓ System structure:
  - max. array voltage and current values
  - number of strings for the array
  - number of panels for each string

8 TECHNICAL FEATURES

8.1 Input Values

WARNING: the Photovoltaic field and system wiring must be configured in such a way that the PV input voltage is less than the maximum upper limit independently from the type, the number and the operating conditions of the chosen photovoltaic panels.
As panel voltage also depends on working temperature, the number of panels per string shall be chosen according to the min. ambient temperature expected in that special area (see table A).

WARNING: The open circuit voltage of the photovoltaic panels is affected by the ambient temperature (the open circuit voltage increases as the temperature decreases). You have to make sure that at the minimum temperature estimated for the installation doesn't cause the panels to exceed the maximum upper limit of 600Vdc. As an example, the following table shows for typical panels of 36, 48 and 72 cells the maximum voltage of each panel as function of the temperature (assuming a nominal open circuit voltage of 0.65Vdc at 25°C and an increase of 0.0023V/°C for a decrease of temperature. The table shows, therefore, the maximum number of panels that can be connected in series as a function of the minimum temperature at which the system will operate. Consult the panel manufacturer for the correct temperature coefficient of V_{oc}, before calculating the voltage rating of the photovoltaic array.

NOTE: The inverter has a linear power derating related to the input voltage, starting from 530 Vdc (100% output power) to 580 Vdc (0% output power)

Minimum Panel Temp.[°C]	36 Cells Panels		48 Cells Panels		72 Cells Panels	
	Panel voltage	Max number of panels	Panel voltage	Max number of panels	Panel voltage	Max number of panels
25	21.6	27	28.8	20	43.2	13
20	22.0	27	29.4	20	44.0	13
15	22.4	26	29.9	20	44.9	13
10	22.8	26	30.5	19	45.7	13
5	23.3	25	31.0	19	46.5	12
0	23.7	25	31.6	19	47.3	12
-5	24.1	24	32.1	18	48.2	12
-10	24.5	24	32.7	18	49.0	12
-15	24.9	24	33.2	18	49.8	12
-20	25.3	23	33.8	17	50.7	11
-25	25.7	23	34.3	17	51.5	11

Table A

Description	Value PVI-2000-OUTD-UK
Nominal input voltage	360Vdc
Minimum input voltage to connect to the grid	200Vdc
"Absolute Maximum Rating" for input voltage	600Vdc
Input voltage, MPPT operating range	90Vdc to 580Vdc
Input voltage, MPPT range at full power	220Vdc to 530Vdc
Max. short circuit current	12Adc
Max. operating input current	10Adc
Max. input power	2200 W
PV Ground fault protection	Ground fault detection and shut off of utility-interactive inverter
Array configuration	One array

As stated above, AURORA performs an analysis of the photovoltaic field and constantly researches the max. input Dc power point. This process is called **MPPT** (Maximum Power Point Tracking).

NOTE: If the input current supplied by the photovoltaic field connected to the inverter is above the max. value and the input voltage is within the allowed range, the inverter is not damaged.

8.2 Output Values

Description	Value PVI–2000–OUTD-UK
Nominal Output Power	2000 W
AC voltage, max. operating range	180 Vac to 264 Vac
AC voltage, nominal	230 Vac
AC voltage, operating range in acc. to UK G83\1	from 82% to 115% of nominal (188.6Vac to 264Vac / V_{nom}=230Vac)
AC Frequency, max. operating range	47Hz to 53 Hz
AC Frequency, nominal	50 Hz
AC Frequency, operating range in acc. to UK G83\1	49.72Hz to 50.28 Hz (up to 49Hz to 51Hz)
Nominal Output Current	10 Arms
Overcurrent Protection level	11 Arms

8.3 Grid protection characteristics

Anti islanding protection	According to UK G83\1

8.4 General characteristics

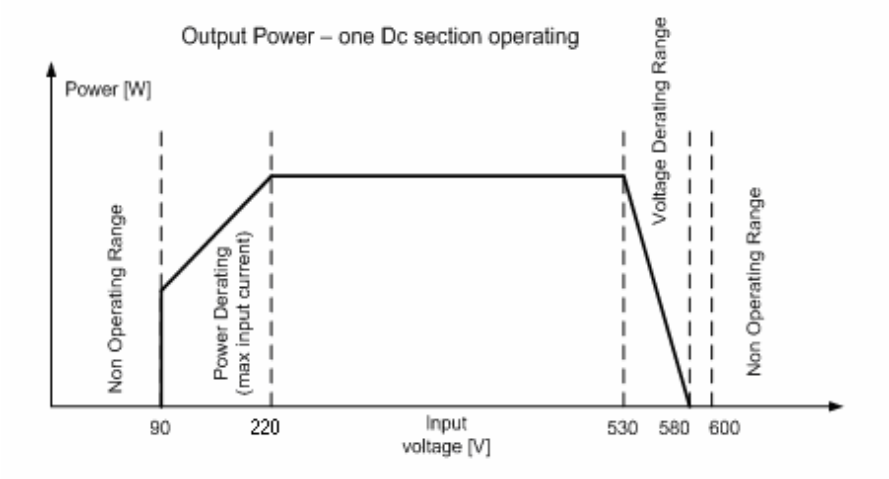
Description	Value PVI-2000-OUTD-UK
Maximum efficiency	96%
Internal consumption during stand-by	< 8 W
Internal consumption during night time	< 0,30 W
Operating ambient temperature	-25°C to +60°C (-13°F to 140°F)
Enclosure type	IP65 / Nema 4X
Relative Humidity	0 – 100 % condensing
Audible Noise	< 30dBA @1m with Fan off < 50 dBA @1m with Fan @ max. speed
Size (height x width x depth):	420 x 310 x 144 mm
Weight	12 kg

8.5 Power Derating

To ensure inverter safe operation under any temperature and electrical condition, the unit will automatically derate the power to be delivered to the grid.
Power derating can occur on one of the two following occasions:

Power Derating due to Ambient Temperature
AURORA is equipped with an integral high reliability cooling fan with automatic control of the rotational speed to ensure that the components are always run well-within their operating temperature limits.
Under severe operating conditions (when ambient temperature is very high) even with integral fan at maximum speed the unit may start to derate the output power.
Several environmental factors can influence the operating temperature of the unit, such as ambient air temperature, airflow, exposure to sun radiation, input voltage and power, orientation of the heatsink fins, etc.
AURORA is able to supply the maximum rated output power (i.e. 2.000W) with ambient temperatures up to 40°C, in case the unit is not directly exposed to solar radiation or heat sources that may cause a further increase of the internal temperature.

Power Derating due to Input Voltage
The graph shows the automatic derating of delivered power when input voltage values are too high or too low.



RWTÜV

Accreditamento EN 45011 N. ZLS-ZE-434/04 emesso da ZLS (data scadenza: 2007-12-31)
EN 45011 Accreditation No. ZLS-ZE-434/04 issued by ZLS (expiry date: 2007-12-31)

OGGETTO: Dichiarazione di conformità alla prescrizione ENEL Distribuzione S.p.A. DK 5950 (Ed. 1.1 del Marzo 2002), integrata dalla lettera Enel Distribuzione S.p.A., datata 06/10/2004, rif. DD/P2004010096.
SUBJECT: *Declaration of Conformity to ENEL Distribuzione S.p.A. Specification DK 5950 (Ed. 1.1, March 2002), integrated by the letter Enel Distribuzione S.p.A., dated 06/10/2004, rif. DD/P2004010096.*

TIPOLOGIA DI APPARATO A CUI SI RIFERISCE LA DICHIARAZIONE:
TYPE OF APPARATUS WHICH THE DECLARATION IS REFERRED TO:

DISPOSITIVO DI INTERFACCIA Interface Device	PROTEZIONE DI INTERFACCIA Interface Protection Device	DISPOSITIVO DI CONVERSIONE STATICA Static Conversion Device
☒ *NOTA/Note*	☒	☒

NOTA: il dispositivo di interfaccia prevede l'utilizzo di adeguati fusibili o breakers esterni da collegare in sede di installazione, come da manuale di installazione ed uso.
NOTE: the interface device requires the use of adequate external fuses or breakers, to be connected during the installation, as stated in the user and installer Manual.

Costruttore *Manufacturer*	Magnetek S.p.A. Via San Giorgio, 642 I-52028 Terranuova Bracciolini (AR)
Modello/Tipo *Model/Type*	AURORA PVI-2000-IT; AURORA PVI-2000-OUTD-IT
Firmware release	Microprocessor: F.1.3.3; DSP DC-DC: D.9.0.2; DSP Inverter: E.9.0.1
Laboratorio di Prova *Test Laboratory*	Eurotest Laboratori S.r.l., Via dell'Industria, 18 - 35020 Brugine (PD) Accreditamento SINAL N. 0182

Esaminati i Fascicoli Prove n° 05C230001/EMC01, 05C230001/DK01, 06C230001/RAP02, emessi da Eurotest Laboratori S.r.l.
Having assessed the Test Files no. 05C230001/EMC01, 05C230001/DK01, 06C230001/RAP02, issued by Eurotest Laboratori S.r.l.
si dichiara che i prodotti indicati soddisfano i requisiti della specifica Enel Distribuzione DK 5950 (Ed. 1.1 del Marzo 2002), integrata dalla lettera Enel Distribuzione, datata 06/10/2004, rif. DD/P2004010096.
we declare that the products indicated meet the requirements laid down by Enel Distribuzione Specification DK 5950 (Ed. 1.1, March 2002), integrated by the letter Enel Distribuzione, dated 06/10/2004, rif. DD/P2004010096.

Validità del Certificato Validity of the Certificate	Questo Certificato è valido per i prodotti indicati, così come descritti nei Fascicoli citati. Nuovi requisiti o emendamenti a requisiti esistenti, così come modifiche ai prodotti, possono implicare nuove verifiche e certificazioni. *This Certificate is valid only for the products indicated herein, as described in the Files mentioned. New requirements or amendment to existing ones, or modifications to the product, may imply re-verification and re-certification.*

Data di emissione
Issue Date 2006-01-31

Carlo Tarantola

Dichiarazione N. / *Declaration No.* 257J06001/A

RWTÜV Italia S.r.l.
Via Pisacane, 46 – I-20025 Legnano